CLAIMS

1. A method for defining quadrature-axis magnetizing inductance of a synchronous machine when the synchronous machine is fed with an inverter, **characterized** in that the method comprises the steps of

starting the synchronous machine without load or with reduced load,

keeping the rotor current of the synchronous machine substantially at zero,

accelerating the synchronous machine to initial angular velocity of measurement,

controlling the load angle (δ_s) of the synchronous machine substantially to 90 degrees,

defining the stator voltage ($\bar{u}_s$), the stator current ($\bar{i}_s$) and the electrical angular velocity (ω) of the synchronous machine, and

defining the quadrature-axis magnetizing inductance (L_{mq}) of the synchronous machine on the basis of the stator voltage ($\bar{u}_s$), the stator current ($\bar{i}_s$) and the electrical angular velocity (ω) of the machine.

2. A method as claimed in claim 1, **characterized** in that the start-up of the synchronous machine comprises a step of starting the synchronous machine at reduced flux.

3. A method as claimed in claim 1 or 2, **characterized** in that the method also comprises a step of changing the flux of the synchronous machine and performing the definition of the stator voltage ($\bar{u}_s$), stator current ($\bar{i}_s$), and electrical angular velocity (ω) of the machine, and the definition of quadrature-axis magnetizing inductance (L_{mq}) based thereon repeatedly as the flux changes.

4. A method as claimed in claim 3, **characterized** in that the flux of the synchronous machine is changed step by step, and the measurements are made after each stepwise change.

5. A method as claimed in claim 3 or 4, **characterized** in that the method also comprises a step of accelerating the speed of the machine.

6. A method as claimed in claim 1 or 2, **characterized** in that the start-up of the machine comprises a step of starting the machine at a limited load angle.

7. A method as claimed in any one of the preceding claims 1 to 2, **characterized** in that keeping the rotor current of the machine substan-

tially at zero comprises a step of shorting out the rotor coils, opening them or equipping them with a resistor, or of feeding the rotor coils from a current supply.

8. A method as claimed in any one of the preceding claims 1 to 7, **characterized** in that the quadrature-axis magnetizing inductance (L_{mq}) of the synchronous machine is calculated by formula $L_{mq} = -\frac{u_{sd}}{\omega i_{sq}} - L_{s\sigma}$, wherein u_{sd} is the direct-axis component of the stator voltage, ω is the electrical angular velocity of the motor, i_{sq} is the quadrature-axis component of the stator current, and $L_{s\sigma}$ is the known leakage inductance of the stator.

9. A method as claimed in any one of the preceding claims 1 to 7, **characterized** in that the definition of the quadrature-axis magnetizing inductance of the synchronous machine comprises the steps of

calculating by means of the quadrature-axis magnetizing inductance (L_{mq}), known leakage inductance ($L_{s\sigma}$) of the stator, electrical angular velocity (ω) of the motor and the defined direct-axis component (i_{sq}) of the stator current an estimate ($u_{sd,est}$) for the direct-axis component of the stator voltage by using the formula the $u_{sd,est} = -\omega i_{sq}(L_{mq} + L_{s\sigma})$,

comparing the estimate ($u_{sd,est}$) of the stator voltage direct-axis component with the defined stator voltage (u_{sd}), and

correcting the magnitude of the quadrature-axis magnetizing inductance (L_{mq}) on the basis of the comparison.